Remarks

Claims 1-34 are currently pending in the present application. The Examiner is thanked for indicating that Claims 4, 6, 8, 9, 12-15, 20-24, and 27-34 includes allowable subject matter. Nonetheless, the Applicant has cancelled Claims 2, 4, 5-7, 11, 14, 15, 17-19, 26, 29, and 30. Claim 1 was amended to include subject matter previously recited in Claim 2; Claim 10 was amended to include subject matter previously recited in Claim 11; Claim 16 was amended to include subject matter previously recited in Claim 19; and Claim 25 was amended to include subject matter previously recited in Claim 26. Claims 3, 8, 12, 20, and 27 were amended to correct informalities. The Applicant submits that no new matter has been added. In view of the following remarks, the Applicant respectfully submits that all the claims of the present application are fully patentable over the cited art of record.

Claim Rejections under 35 U.S.C. §103

The Applicant acknowledges the rejection of Claims 1-3, 5, 7, and 10-11 as being unpatentable over Publication Serial No. 0-7803-3636-4/97 entitled "Transmit Pulse Shaping Filters and Cordic Algorithm based Precompensation for Digital Satellite Communications", (IEEE 1997), to Vanderaar et al., hereinafter "Vanderaar", in view of U.S. Patent No. 7, 039, 130 to Hurley, hereinafter "Hurley". The Applicant further acknowledges the rejection of Claims 16-19 and 25-26 as being unpatentable over Vanderaar in view of Hurley and further in view of U.S. Patent No. 6,834,084 to Hietala, hereinafter "Hietala".

For reasons discussed below, the Applicant respectfully submits that Claims 1, 3, and 10 are fully patentable over the theoretical combination of Vanderaar and Hurley; and Claims 16 and 25 are fully patentable over the theoretical combination of Vanderaar, Hurley, and Hietala. As to Claims 2, 6, 7, 11, 17-19, and 26, the Applicant submits that the grounds for rejection of

these Claims are now moot in view their being cancelled.

Claim 1 of the present application is directed towards receiving an input wave and generating an output signal using a polar-based modulation scheme. According to aspects recited in Claim 1, rectangular coordinate information for an electromagnetic input wave is received and *directly converted* into independent magnitude, sin(Φ), and cos(Φ) signals which when combined, represent the input wave. The rectangular-to-polar conversion is accomplished via a CORDIC (COrdinate Rotation Digital Computer) using shift and add/subtract operations. Unlike prior art schemes, the polar conversion scheme of Claim 1 does not require the use of a sine look-up table, nor the use of an additional CORDIC module (for use in calculating Φ). The phase portion of the input wave (i.e., sin(Φ) and cos(Φ) signals) is utilized to modulate one or more carrier waves, thereby producing one or more modulated carrier wave signals. (see paragraph [0023] of the specification). The modulated carrier wave(s) may be recombined and amplified to produce an output signal that represents an amplified version of the input wave. Generating independent signals (e.g., sin(Φ) and cos(Φ) signals) that represent the input waves allows for the efficient individualized correction of each of these signals (sin(Φ), and cos(Φ) signals). As a result, the linearity of the amplified output signal may be maintained in an efficient manner.

In sharp contrast, Vanderaar is directed to a transmit pulse shaping filters and CORDIC algorithm-based precompensation for digital satellite communications. With regard to precompensation, Vanderaar teaches transforming In-Phase (I) and Quadrature (Q) data of a wave into magnitude (r) and phase (θ) using a CORDIC processor that *requires look up tables*. (see 3.1, 3.7 and Figs. 7 and 10 of Vanderaar). Vanderaar utilizes computer simulations to determine the L-stage CORDIC processor that will yield an acceptable noise floor. (Id.).

Unlike Claim 1 of the present application, however, Vanderaar fails to disclose utilizing a *direct* CORDIC algorithm to convert rectangular information into independent magnitude, sin(Φ), and cos(Φ) signals, which as discussed above, may be utilized to modulate one or more carrier wave(s). Indeed, the Office Action acknowledges that Vanderaar fails to disclose such a feature. Nonetheless, the Office Action looks to Hurley to provide the feature of utilizing a CORDIC algorithm to *directly* convert rectangular coordinate information into magnitude, sin(Φ), and cos(Φ) signals. A close examination of Hurley, however, reveals otherwise.

Hurley is directed towards correcting phase error rotation angles using CORDIC and vector averaging functions. (see Title, Abstract of Hurley). According to Hurley, I and Q values that comprise an input vector is first rotated by an Expected Correction Angle value. (see col. 7, lines 35-38 of Hurley). Once I and Q values have been rotated, an estimate of phase rotation error is calculated. (see col. 8, lines 8-10 of Hurley). Using CORDIC, the values of the rotated I and Q values are converted from rectangular-to-polar coordinate values. (see col. 8, lines 15-18 of Hurley). The angle of the resulting polar values is then subtracted from 45 degrees and added to a time-delayed value of the Expected Correction Angle in order to calculate an estimated correction angle for future rotations.

Similar Vanderaar, and unlike Claim 1 of the present application, Hurley fails to disclose the <u>direct</u> polar conversion, i.e., polar conversion that does <u>not</u> require the use of look up tables. Instead, as explained by Hurley, "[t]he present invention reduces the complexity required by deriving a normalized vector from the estimated angle using <u>*sine-cosine*</u> lookup table 344." [emphasis added]. (see col. 8, lines 27-32 of the Hurley). Therefore, since Hurley fails to disclose the feature of *directly* converting rectangular coordinate information into magnitude, sin(Φ) and cos(Φ) signals, the theoretical combination of Vanderaar and Hurley also fails to

disclose such a feature. Accordingly, the Applicant submits that Claims 1, 3, and 10, and Claims 8, 9, 12, and 13 which recite similar features, are fully patentable over the theoretical combination of Vanderaar and Hurley.

The Applicant further submits that Hietala fails to cure the deficiencies of both Vanderaar and Hurley. Namely, Hietala fails to disclose or suggest *directly* converting rectangular coordinate information into magnitude, sin(Φ) and cos(Φ) signals via CORDIC using shift and add/subtract operations. Accordingly, the Applicant submits that Claims 16 and 25, and Claims 20-25, 27, 28, and 31-34 which recite similar features, are fully patentable over the theoretical combination of Vanderaar, Hurley, and Hietala.

Conclusion

In view of the foregoing remarks, the Applicant respectfully submits that the present application, including Claims 1, 3, 8, 9, 10, 12, 13, 16, 20-25, 27, 28, and 31-34, is fully patentable over the cited art of record. Accordingly, reconsideration and withdraw of all grounds of rejection is earnestly requested.

Respectfully submitted,

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